D RS

UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Washington, D.C. 20230

July 21, 1999

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
The Portals
445 Twelfth Street, S.W.
Washington, D.C. 20554

DOCKET FILE COPY ORIGINAL

RECEIVED
JUL 21 1999
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Re: Amendment of Parts 2 and 25 to Implement the Global Mobile Personal Communications by Satellite (GMPCS) Memorandum of Understanding and Arrangements, IB Dkt. No. 99-67, Petition of the National Telecommunications and Information Administration to Amend Part 25 of the Commission's Rules to Establish Emissions Limits for Mobile and Portable Earth Stations Operating in the 1610-1660.5 MHz Band, RM No. 9165

Dear Ms. Salas:

Enclosed please find one original and six copies of the Reply Comments of the National Telecommunications and Information Administration in the above-referenced docket and rulemaking. The comments were also submitted in electronic form on diskettes in WordPerfect 5.1 to Paul Gordon in your office and delivered to the Commission's copy contractor, International Transcription Service.

Please direct any questions you may have regarding this filing to the undersigned. Thank you for your cooperation.

Respectfully submitted,

Kathy Smith

Kathy Smith
Acting Chief Counsel

cc: Christopher J. Murphy, International Bureau
International Transcription Service

Enclosures

No. of Copies rec'd 0
List A B C D E

RECEIVED
JUL 21 1999
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Amendment of Parts 2 and 25 to Implement the Global Mobile Personal Communications by Satellite (GMPCS) Memorandum of Understanding and Arrangements	)	IB Docket No. 99-67
	)	
Petition of the National Telecommunications and Information Administration to Amend Part 25 of the Commission's Rules to Establish Emissions Limits for Mobile and Portable Earth Stations Operating in the 1610-1660.5 MHz Band	)	RM No. 9165

REPLY COMMENTS OF THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION

Larry Irving
Assistant Secretary for
Communications and Information

William Hatch
Acting Associate Administrator
Office of Spectrum Management

Edward Drocella
David Anderson
Electronics Engineers
Office of Spectrum Management

Jeng Mao
Telecommunications Policy Analyst
Public Safety Program

Kathy Smith
Acting Chief Counsel

National Telecommunications and
Information Administration
U.S. Department of Commerce
Room 4713
1401 Constitution Avenue, N.W.
Washington, DC 20230
(202) 482-1816

July 21, 1999

Table of Contents

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Amendment of Parts 2 and 25 to Implement the Global Mobile Personal Communications by Satellite (GMPCS) Memorandum of Understanding and Arrangements	)	IB Docket No. 99-67
	)	
Petition of the National Telecommunications and Information Administration to Amend Part 25 of the Commission's Rules to Establish Emissions Limits for Mobile and Portable Earth Stations Operating in the 1610-1660.5 MHz Band	)	RM No. 9165

REPLY COMMENTS OF THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION

The National Telecommunications and Information Administration (NTIA) respectfully submits the following Reply Comments in response to the Commission's Notice of Proposed Rulemaking in the above-captioned proceeding.[1] Specifically, NTIA addresses comments concerning the narrow band out-of-band emission limit proposed by the Commission, the Commission's decision not to exempt Inmarsat-A terminals from the proposed out-of-band emission limits, the voluntary certification of mobile-satellite service (MSS) terminals, and Enhanced 9-1-1 (E911) capabilities for Global Mobile Personal Communications by Satellite (GMPCS) terminals.

---

[1] *Amendments of Parts 2 and 25 to Implement the Global Mobile Personal Communications by Satellite (GMPCS) Memorandum of Understanding and Arrangements and Petition of the National Telecommunications and Information Administration to Amend Part 25 of the Commission's Rules to Establish Emissions Limits for Mobile and Portable Earth Stations Operating in the 1610-1660.5 MHz Band*, IB Docket No. 99-67 and RM No. 9165, FCC 99-37 (rel. March 5, 1999) (hereinafter "GMPCS NPRM").

I. THE NARROW BAND OUT-OF-BAND EMISSION LIMIT PROPOSED BY THE COMMISSION IS NECESSARY TO PROTECT GNSS RECEIVERS AND SHOULD EXTEND ACROSS THE 1559-1605 MHz BAND.

The Commission proposed to adopt rules that will require all MSS terminals operating in the 1610-1660.5 MHz band to meet a wide band equivalent isotropically radiated power (EIRP) density limit for out-of-band emissions of -70 dBW/MHz and a narrow band EIRP limit of -80 dBW for discrete spurious emissions of less than 700 Hz bandwidth in the 1559-1605 MHz band.[2] These out-of-band emission limits were developed to protect Global Navigation Satellite System (GNSS) receivers used for precision approach aircraft landings. The GNSS includes the U.S. Global Positioning System (GPS), the Russian Federation Global Navigation Satellite System (GLONASS) and their augmentation systems.

Three commenters addressed the narrow band emission limit proposed by the Commission. Hughes Network Systems recommends that the Commission defer adoption of the narrow band emission limit until there has been sufficient time to consider the essentiality of the limit.[3] One group of joint commenters states that certifying GMPCS terminals to an arbitrary narrow band limit could erect a barrier to free roaming.[4] Motorola recommends that the Commission restrict the narrow band requirement to just the GPS portion of the band to simplify radio design and reduce handset cost.[5] NTIA strongly disagrees with these commenters and believes that the narrow band out-of-band emission limit proposed by the Commission is

---

[2] GMPCS NPRM at ¶ 46.

[3] Comments of Hughes Network Systems, IB Dkt. No. 99-67, at 1 (June 21, 1999).

[4] Joint Comments of L/Q Licensee, Inc., Globalstar, L.P. and Airtouch Satellite Services U.S., Inc. (Joint L/Q Licensee Comments), IB Dkt. No. 99-67, at 25 (June 21, 1999).

[5] Comments of Motorola, Inc.(Motorola Comments), IB Dkt. No. 99-67, at 17 (June 21, 1999).

necessary to protect GNSS receivers and should extend across the entire 1559-1605 MHz band.

The GPS and Wide Area Augmentation System (WAAS) receivers process the Standard Positioning Service (SPS) Coarse/Acquistion (C/A) code signal centered at 1575.42 MHz.[6] The spectrum of the C/A code signal consists of a two sided bandwidth with a $[\sin(x)/x]^2$ envelope with nulls at n/T_c, ($n*1.023$ MHz), where T_c is the psuedo random noise (PRN) code chipping period.

The exact impact of interference to a GPS or WAAS receiver is primarily dependent on the type of interference. GPS and WAAS receivers using the C/A code are known to be susceptible to narrow band interference primarily because of the relatively short period of the C/A code.[7] With a period of 1 millisecond, the C/A code spectrum is not continuous, but rather it is a line spectrum with discrete lines at 1 kHz intervals. In addition, there are some "strong lines" in each C/A code that can deviate significantly from a $[\sin(x)/x]^2$ envelope. This makes a C/A code receiver vulnerable to continuous wave (CW) or very narrow band interfering signals since they can mix with a strong C/A code line and leak through the correlator.[8]

The narrow band out-of-band emissions from MSS terminals operating in the 1610-1660.5 MHz band may be CW if they are synthesizer spurs or they may be modulation artifacts having somewhat wider bandwidths. Since some spectral lines can be as much as 10 dB higher than the $[\sin(x)/x]^2$ envelope, the susceptibility of the C/A code to extremely narrow band

---

[6] The GPS SPS signal extends through the band 1563.42 to 1587.42 MHz.

[7] RTCA Inc., Special Committee No. 159, *Assessment of Radio Frequency Interference Relevant to the GNSS*, Document No. RTCA/DO-235 (RTCA/DO-235), at C-4 (Jan. 27, 1997).

[8] A correlator is that section of a spread spectrum system in which a received signal and the local reference are compared for agreement. The desired, synchronized signal is despread and undesired signals are spread.

interference can increase by approximately 10 dB.[9] This means that the power of a narrow band interfering signal must be 10 dB lower than that of a wide band interfering signal to protect GPS and WAAS receivers.

The GLONASS Standard Accuracy Signal (SAS) has a code that is similar to the GPS C/A code. The SAS code employs a pseudo-random code that has a chip rate of 0.511 MHz and a period of 1 millisecond. Therefore, the impact to GLONASS SAS code receivers to increasingly narrow band interfering signals will essentially be the same as that of a GPS C/A code receiver. The International Civil Aviation Organization (ICAO) continues to work to incorporate GLONASS into the GNSS on an equal basis with GPS. The operation of GLONASS frequencies should be fully protected in U.S. airspace since it will be used by non-U.S. aircraft operating in U.S. airspace. Such aircraft are permitted to use the U.S. airspace under Chapter 2 of the Convention of International Civil Aviation and may use GLONASS as their sole means of navigation.[10]

Finally, the need for 10 dB of additional protection from narrow band interference for GPS C/A and GLONASS SAS receivers is documented in a recently developed International Telecommunication Union-Radiocommunication Sector (ITU-R) Draft New Recommendation (DNR) for the technical characteristics of radionavigation satellite service receivers to be used in interference studies.[11] This DNR was approved at the April meeting of ITU-R Working Party

---

[9] Christopher J. Hegarty, *Analytical Derivation of Maximum Tolerable In-Band Interference Levels for Aviation Applications of GNSS*, Journal of the Institute of Navigation, Vol. 44, No. 1 (March 1997).

[10] Convention on International Civil Aviation, Chapter 2 (Chicago 1947).

[11] Draft New Recommendation ITU-R M.[RNSS.CHAR] Technical Characteristics of Current and Prospective RNSS (Space-to-Earth) and ARNS Receivers to be Considered in Interference Studies in the Band 1559-1610 MHz.

8D.

Based on the susceptibility of GPS and WAAS C/A code and GLONASS SAS receivers to narrow band interference, NTIA supports the Commission's proposal to adopt both a wide band and a narrow band limit for the out-of-band emissions of MSS terminals operating in the 1610-1660.5 MHz band. Furthermore, since the impact of narrow band interference will essentially be the same for GPS, WAAS, and GLONASS receivers, the narrow band limit should extend across the 1559-1605 MHz band as currently proposed by the Commission.

II. A BANDWIDTH OF 300 Hz SHOULD BE ADOPTED FOR THE MEASUREMENT OF GMPCS MSS TERMINAL NARROW BAND OUT-OF-BAND EMISSIONS IN THE 1559-1605 MHz BAND.

There appears to be some confusion regarding the appropriate measurement bandwidth to be used for the narrow band out-of-band emissions.[12] The confusion seems to center around the value of 700 Hz contained in the petition for rulemaking filed by NTIA.[13] The 700 Hz was never intended to be the bandwidth used for the narrow band out-of-band emission measurements. This value was taken from the RTCA Special Committee 159 report and represents a break point to distinguish between the narrow band and wide band interference susceptibility levels for GNSS receivers.[14] Motorola states that narrow band emissions can be measured more accurately using a measurement bandwidth less than 700 Hz.[15] NTIA agrees and believes that it would be appropriate to measure the total power for the narrow band out-of-band emissions with a 300 Hz

---

[12] Motorola Comments at 14.

[13] NTIA Petition for Rulemaking, Amendment to the Commissions Rules to Incorporate Mobile Earth Station Out-of-Band Emissions, RM No.9165, at 3 (Sept. 19, 1997)(placed on Public Notice, Report No.2227 (Sept. 23, 1997)).

[14] RTCA/DO-235 at G-1.

[15] Motorola Comments at 14.

resolution bandwidth which is available on existing spectrum analyzers and recommends that the Commission adopt this for the measurement bandwidth of narrow band emissions in the 1559-1605 MHz band.

III. NTIA SUPPORTS THE COMMISSION'S DECISION NOT TO EXEMPT INMARSAT-A TERMINALS FROM THE OUT-OF-BAND EMISSION LIMITS REQUIRED TO PROTECT GNSS RECEIVERS.

In the GMPCS NPRM, the Commission proposes not to exempt Inmarsat-A terminals (both terrestrial and maritime) from the out-of-band emission limits required to protect GNSS receivers used for Category I precision approach landings.[16] In their comments, Comsat and Inmarsat ask the Commission to reconsider this decision. Comsat recommends that to protect GNSS receivers used in precision approach landings, the Commission could restrict Inmarsat-A terminal operations within exclusion zones around airports.[17] Inmarsat maintains that the Commission has full control of the situation and that the detailed restrictions that apply to the current operations of these terminals should permit the use of non-compliant terminals without any risk of interference to GPS or GLONASS.[18]

NTIA does not agree that exclusions zones are a practical solution. Comsat fails to provide any information on how exclusion zones around airports would be implemented with the capabilities to satisfy the established requirements for accuracy, availability, continuity, and integrity that are required to protect instrumented approach operations. In their discussion of

---

[16] GMPCS NPRM at ¶¶ 85, 89. Inmarsat-A terminals form an important component of the Global Maritime Distress and Safety System of the International Maritime Organization.

[17] Comments of COMSAT Corporation (Comsat Comments), IB Dkt. No. 99-67, at 17 (June 21, 1999).

[18] Comments of Inmarsat Ltd. (Inmarsat Comments), IB Dkt. No. 99-67, at 10 (June 21, 1999).

E911 requirements, Comsat acknowledges that it is difficult for a satellite to locate a mobile terminal with any more precision than what beam is being accessed.[19] This inability of a satellite system to locate a mobile terminal with a degree of accuracy that is greater than the footprint of the satellite beams would appear to be contradictory to the use of exclusion zones, where a mobile terminal's location in the vicinity of an airport would have to be known.

In support of the exclusion zone concept, Inmarsat performed an analysis that examines the interference from an Inmarsat-A terminal to a GNSS receiver used in a Category I precision approach landing.[20] Based on the calculated maximum levels of interference it does not appear that this analysis considers a worst-case scenario where a GNSS equipped aircraft passes through the mainbeam or the close-in sidelobes of an Inmarsat-A terminal antenna. To address this scenario an analysis is provided in Annex A to NTIA's Reply Comments that shows the GNSS protection threshold is exceeded by 14 dB for mainbeam antenna coupling and 11 dB for first sidelobe antenna coupling. Moreover, given the beamwidth of the Inmarsat-A antenna radiation pattern, the amount of time that the GNSS receiver interference threshold is exceeded could be appreciable.

Because exclusion zone have not been demonstrated to provide a practical alternative, NTIA supports the Commission's decision not to exempt Inmarsat-A terminals from the out-of-band emission limits required to protect GNSS receivers used for precision approach landings.

IV. A VOLUNTARY CERTIFICATION OR TYPE APPROVAL PROCESS FOR MSS TERMINALS SHOULD NOT EXEMPT THEM FROM THE OUT-OF-BAND EMISSION LIMITS REQUIRED TO PROTECT GNSS RECEIVERS.

In its comments, Iridium recommends that the U.S. certification or type approval process

---

[19] Comsat Comments at 14.

[20] Inmarsat Comments at Annex 1.

be voluntary, not mandatory.[21] NTIA recognizes that the GMPCS Memorandum of Understanding is voluntary and primarily addresses the need to promote transborder use of equipment. However, whether a mandatory or voluntary process is adopted, NTIA believes that the Commission should still require that all MSS terminals operating in the 1610-1660.5 MHz band comply with the currently proposed wide band and narrow band out-of-band emission limits necessary to protect GNSS receivers used for Category I precision approach aircraft landings.

V. THE COMMISSION SHOULD CREATE A FACT-FINDING COMMITTEE TO DEVELOP NATIONAL STANDARDS AND PSAP DATABASES.

NTIA reiterates its belief that the ability to locate wireless users in distress is in the public interest.[22] NTIA agrees with some commenters that GMPCS users are likely to have the same expectations as cellular and PCS users when making emergency 911 calls.[23] The importance of GMPCS terminals that facilitate E911 capabilities becomes more apparent in areas that are not serviced by cellular or Personal Communication Service (PCS) systems and in situations where the caller cannot identify his or her location.[24] NTIA believes in examining this issue the Commission should not lose sight of its objective "of promoting safety of life and property

---

[21] Comments of Iridium LLC (Iridium Comments), IB Dkt. No. 99-67, at 4 (June 21, 1999).

[22] Comments of the National Telecommunications and Information Administration, IB Dkt. No. 99-67, at 26 (June 21, 1999).

[23] Comments of Association of Public-Safety Communications Officials-International, Inc. (APCO Comments), IB Dkt. No. 99-67, at 2 (June 21, 1999); Comments of the United States Coast Guard (USCG Comments), IB Dkt. No. 99-67, at 3 (June 21, 1999).

[24] APCO Comments at 2; USCG Comments at 7.

through the use of wire and radio communication."[25]

Several MSS system operators have commented that the state of mobile-satellite technology being deployed makes requiring implementation of E911 capabilities premature.[26] One commenter stated that providing position information to the 125 meter accuracy required for terrestrial services is not possible without substantially compromising the cost and battery life of MSS terminals.[27] Several commenters state that it may be difficult for an MSS system to route a 911 call from the gateway through the public switched telephone network to the appropriate Public Safety Answering Point (PSAP).[28] Many of the commenters also state that GMPCS terminals have international implications requiring careful planning and implementation of E911 services.[29] In contrast, according to the United States Coast Guard (USCG), Association of Public-Safety Communications Officials-International, Inc. (APCO), and National Search and Rescue Committee (NSARC), current MSS technology would allow determination of position to an accuracy of the 125 meters RMS standard adopted by the Commission in the E911 Report and

---

[25] *Communications Act of 1934*, 47 U.S.C. § 151 (1998).

[26] Comments of AMSC Subsidiary Corporation, IB Dkt. No. 99-67, at 17 (June 21, 1999); Joint L/Q Licensee Comments at 27; Comments of Iridium North America (INA Comments), IB Dkt. No. 99-67, at 2 (June 21, 1999)(joining and incorporating Motorola Comments); Comments of Satellite Industry Association (SIA Comments), IB Dkt. No. 99-67, at 5 (June 21, 1999); Iridium Comments at 12.

[27] Comments of Constellation Communications Inc., IB Dkt. No. 99-67, at 14 (June 21, 1999).

[28] APCO Comments at 3; Joint L/Q Licensee Comments at 28; Comsat Comments at 14.

[29] Some commenters suggest that the issue of E911 implementation should be left for study by the ITU because of its affect to the worldwide systems. Comments of the Ministry of Posts and Telecommunications of Japan, IB Dkt. No. 99-67, at 1 (May 21, 1999); Constellation Comments at 15; Inmarsat Comments at 11; USCG Comments at 9-10; Joint L/Q Licensee Comments at 28; Iridium Comments at 13; and SIA Comments at 5.

Order for terrestrial carriers.[30]

NTIA recognizes the issues raised by the commenters are complex, but is concerned with delaying the implementation of position location and E911 capabilities in MSS terminals. Therefore, we support the suggestion of the National Emergency Number Association (NENA) that a committee be formed to study the possibilities of E911 implementation in GMPCS terminals.[31] NTIA also strongly recommends that the Commission create a fact-finding committee to explore the national and international ramifications of E911 capabilities in GMPCS terminals and coordinate its activities with the ITU.[32] Moreover, the Commission may benefit from offers made by public safety organizations in assisting the Commission with the planning, developing, and implementation of national and international standards and PSAP databases.[33]

VI. GMPCS TERMINALS SHOULD BE LABELED TO INDICATE POSITION LOCATION CAPABILITIES.

Several commenters suggested labeling terminals indicating whether a GMPCS terminal can be used for making E911 calls (*i.e.*, having position location capabilities).[34] NTIA believes

---

[30] APCO Comments at 2-3 (commenting on the use of existing Global Positioning System (GPS) technology); Comments of LSC, Inc., IB Dkt. No. 99-67, at 7 (May 2, 1999)(commenting on GPS as one of the leading candidates for providing position capabilities); Comments of National Search and Rescue Committee (NSARC Comments), IB Dkt. No. 99-67, at 3 (June 21, 1999)(commenting on the use of GPS for location capabilities and the findings in the *Search and Rescue and Disaster Support MSS Capabilities Comparison Developed by the ICSAR CMSS Working Group* attached); and USCG Comments at Attachment 1.

[31] Comments of National Emergency Number Association (NENA Comments), IB Dkt. No. 99-67, at 2 (May 3, 1999).

[32] *Id.*

[33] Offers to help the Commission were made by APCO and NENA. APCO Comments at 3; NENA Comments at 2-3.

[34] USCG Comments at 11; NSARC Comments at 4.

this labeling approach would benefit the public by informing them that certain terminals cannot be used for E911 calls. Therefore, NTIA recommends that the Commission consider adopting this type of labeling system for GMPCS terminals.

Respectfully submitted,

Kathy Smith

Kathy Smith
Acting Chief Counsel

Larry Irving
Assistant Secretary for
Communications and Information

William Hatch
Acting Associate Administrator
Office of Spectrum Management

Edward Drocella
David Anderson
Electronics Engineers

Jeng Mao
Telecommunications Policy Analyst

National Telecommunications and
Information Administration
U.S. Department of Commerce
Room 4713
1401 Constitution Avenue, N.W.
Washington, DC 20230
(202) 482-1816

July 21, 1999

ANNEX A

IMPACT OF THE LEVELS OF UNWANTED EMISSION OF INMARSAT-A TERMINALS IN THE 1559-1605 MHz BAND ON GNSS RECEIVERS

In this annex the scenario will be considered in which an airplane on final approach using a GNSS receiver passes through the mainbeam and close-in sidelobes of an Inmarsat-A antenna. The maximum interference levels will be calculated and compared to the threshold required to protect GNSS receivers.[35]

It will be assumed that the Inmarsat-A terminal will be located 1 km from the Harlingen airport.[36] Given the terminal's location the elevation angle of 59.4° and the slant range of 36,651.2 km to the Inmarsat satellite orbital location of 98°W were computed. It will also be assumed that the mainbeam of the Inmarsat-A antenna points along the elevation angle. The slant range of 116 feet at which the airplane at the 100 foot decision point passes through the mainbeam of the Inmarsat-A and the corresponding free space propagation loss are computed.

The maximum interference power level (I_{max}) of the Inmarsat-A terminal unwanted emissions at the GNSS receiver is calculated using the following equation:

$$I_{max} = EIRP_{Inmarsat} - G_{off\text{-}axis} - L_{slant} + G_{GNSS}$$

where

$EIRP_{Inmarsat}$ is the unwanted equivalent isotropically radiated power (EIRP) density of the Inmarsat-A terminal in the 1559-1605 MHz band (dBW/MHz);
$G_{off\text{-}axis}$ is the off-axis antenna gain of the Inmarsat-A antenna (dB);
L_{slant} is the free space propagation loss of the slant range between the Inmarsat-A terminal and the GNSS receiver (dB);
G_{GNSS} is the GNSS receiver antenna gain in the direction of the Inmarsat-A antenna (dBic).

The maximum out-of-band emission limit and the antenna radiation pattern of the Inmarsat-A terminal provided by the commenter will be used in this analysis.[37] The GNSS receiver antenna gain of -4.5 dBic will be used because the look angle from the aircraft is approximately 30° and not directly under the aircraft where maximum airframe shielding could be expected.

Table A-1 gives the results of the analysis for both mainbeam and sidelobe antenna coupling.

---

[35] RTCA/DO-235 at Appendix F.

[36] The airport at Harlingen was used because it is closest to the Inmarsat satellite at 98°W and will result in a worst case interference geometry.

[37] Inmarsat Comments at Annex 1.

A negative threshold indicates that the GNSS interference threshold has been exceeded.

TABLE A-1. Maximum Interference Levels

Inmarsat-A Out-of-Band EIRP Density (dBW/MHz)	Inmarsat-A Off-axis Antenna Gain (dB)	Slant Range Free Space Path Loss (dB)	GNSS Receiver Antenna Gain (dBic)	Maximum Calculated Interference Power (dBW/MHz)	GNSS Receiver Protection Threshold (dBW/MHz)	Margin (dB)
Inmarsat-A Mainbeam Antenna Coupling						
-60	0	67.6	-4.5	-132.1	-146.1	-14
Inmarsat-A First Sidelobe Antenna Coupling						
-60	-3	67.6	-4.5	-135.1	-146.1	-11
Inmarsat-A Second Sidelobe Antenna Coupling						
-60	-13	67.6	-4.5	-145.1	-146.1	-1

As shown in Table A-1, the interference protection threshold is exceeded by 14 dB for mainbeam antenna coupling, 11 dB for first sidelobe antenna coupling, and 1 dB for second sidelobe antenna coupling. Based on the beamwidth of the Inmarsat-A antenna radiation pattern, the interference protection criteria can be exceeded over an appreciable amount of time.[38]

[38] The angular sector comprising the mainbeam, first sidelobe, and second sidelobe of the Inmarsat-A antenna is 42° wide.